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WHITE PAPER

How to Control Brain-Centered Hazards™ in the Utilities Industry

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Serious injuries and fatalities (SIFs) can happen to even the most experienced workers who have demonstrated safe performance of the same routine task in a similar environment. Why? The answer to that question points directly to how the brain works. In order to prevent critical errors in these situations, we need to understand how the brain functions and how even small changes in the work environment can lead to performance error that results in serious injury.

Consider this example of welding a bonding nut to a static arm for an overhead ground wire.

It was an easy task for an experienced employee and would not take all that long. It required working at over 100ft in the air. While up in the bucket, there was a fairly strong breeze and a spark from the welding process ignited a fire in the upper hydraulic controls of the bucket. Workers were faced with trying to fight the fire without the right tools and had only one choice: to lower the basket. When the workers attempted to lower themselves from that height, the controls did not function. There was an attempt to use the lower bucket controls which also did not correctly function. The workers escaped out of the bucket where they were rescued using another nearby truck with bucket, but only after serious injuries already occurred.

Like many SIFs, or unplanned events with SIF potential, there were a variety of contributing factors to this incident. Of those, there were multiple human performance factors that played a significant role in the incident and could have led to fatalities if the situation had gone even slightly differently.

First of all, this particular task was routine. It was a job that had been done without incident numerous times by these same workers. The resulting confidence led them to falling into the trap of thinking "this is easy." When we believe something is easy, there is a tendency to operate out of habit and do things the same way they have always been done, regardless of how safe that way actually was or given current situational exposures. The result is workers operating in fast brain – not consciously thinking through what it is that could cause harm.

This was compounded by the fact the workers were working under deadline pressures to move to another project quickly. Feeling higher levels of stress and urgency also promotes increased fast brain functioning. Additionally, there was no visual recognition of the exposure. When in fast brain there is a much greater chance of missing important information that could help identify critical exposures and there is increased potential for errors that can lead to incidents.

In situations such as this, and in order to decrease the impact of fast brain functioning and increase visual recognition, we recommend the following:

- Provide prompts and nudges in work-related documents to check for specific exposures common to the work environment such as weather conditions and checking for specific equipment condition
- Consistently discuss pre-job safety briefs for specific tasks as well as highlight known changes that may add or change exposure
- Consistently complete and talk through pre-task planning and risk assessments

- Create messaging to frontline team members that communicates safety is valued regardless of deadlines and take action to relieve pressure to complete jobs faster
- Use checklists to ensure critical controls are in place for high risk activities

Helpful and Hindering Aspects of the Fast Brain

One part of our brain that supports information processing is the frontal lobe of the cerebrum. This handles our decision making, and conscious, analytical thinking. We call this the "slow brain", as it involves slower, deliberative thought and takes more time and energy to activate behavior. This is our conscious thought and what makes the human brain especially remarkable.

Habits are created and strengthened by structures including the dorsolateral striatum working with the basil ganglia (Crego, et al., 2020; Rosenbloom, et al., 2012). Our habits are driven from our non-conscious fast brain. The fast brain allows us to move fast and get things done quickly without conscious thought. Driving on a highway often occurs via our fast brain. While the fast brain is helpful to move us through mundane tasks that are low risk like brushing our teeth, or chatting with a store clerk, industrial environments elicit challenges where working the same task the same way can result in less-than-right-first-time performance where someone gets hurt. People do not choose which part of the brain, slow or fast, processes information – our brains choose for us, and our default mode is 'fast brain first' whenever possible to conserve brain power.

The scenario above created a prime opportunity for the fast brain to initially guide the work being done. The team member carried out the task habitually, with limited conscious processing of updated information where a change in the environment went undetected.

In other words, the fast brain prevented them from being aware of the change in the environment and responding effectively. Ultimately, this resulted in serious injury.

How Visual Recognition Plays a Role

One other key factor leading to error in this incident has to do with visual recognition.

We see with our brain. The brain tells our eyes to search for information to process and activate behavior that best suits the situation. When our brain does not identify something that is significantly new or different, it seeks to apply similar behavior to a familiar situation. We tend to notice more information in the center of our visual field and close in proximity to us. We also are more prone to miss information in our visual field that our brain does not intentionally seek out. When operating in fast brain, this further compounds the limitations already inherent with our visual system.

Controlling Brain-Centered Hazards

Fast-brain functioning and visual *recognition* are two examples of what we refer to as brain-centered hazards. These are hazards related to our neurological make-up and, if left uncontrolled, increase our likelihood to make errors including critical ones that lead to injury, equipment damage and losses to reputation and the company brand.

Brain-centered hazards impact all people including experienced workers such as the team member in the incident described here. It is important to understand how these two hazards function and then design work environments and activities in a way that accounts for, and controls for them.

The People Are Great, the Way We Work May Need Updating

Many organizations seek to find fault with team or person involved in an incident. In those cases, corrective actions such as re-training, disciplinary action or even job re-assignment often serve as a band-aid for systemic issues that will ultimately rear their ugly head again unless effective layers of protection are incorporated within the way work gets done.

Identifying where within the work and workplace team members are more likely to be vulnerable to the impact of brain-centered hazards is a good first step to protecting people. Historical incident analysis will also provide valuable insight into where these internal brain hazards have gone unaddressed.

Examples of Enhanced Layers of Protection for Improved Human Performance Reliability:

- Provide visual cues highlighting changes in the work environment – especially changes to aspects of the environment that have remained static over a prolonged period of time.
- Use a science-based looking technique to increase how hazards are reliably identified for detection of exposures including those that may be harder to see.
- Building in redundancies, fail-safes, and team member cross-checks for critical error prevention for high exposure tasks
- Determine which non-SIF incidents have SIF potential and identify human performance precursors including brain-centered hazards
- Provide deep understanding to leaders and teams on Human Performance Reliability and what it takes as an organization, as a team, and as individuals to get important work done correctly without incident

The way our brains are wired plays a key role in work-related decisions that have significant implications when it comes to safety, especially in the dynamic, high-risk work carried out in the utilities industry. Understanding brain-centered hazards is imperative for any organization that wants to reduce the potential for critical errors related to safe operation and keeping customers cared for come rain, shine, or storm. Setting up teams for success requires understanding and integration of key human performance concepts to ensure sustainable performance and is paramount for utilities organizations as they seek to move the needle in eliminating SIFs and in evidencing a strong value for team members and their families.

Sources:

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